ENGINEER'S REPORT

KIRBY LANE NORTH/GRACE CHURCH STREET SANITARY SEWER PROJECT

Project No. C3-5399-03-00

PROJECT BENEFIT ANALYSIS

Prepared for

THE CITY OF RYE
WESTCHESTER COUNTY, NY

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Introduction

The Kirby Lane North/Grace Church Street sewer project involves the installation of a new sanitary sewer to serve 30 properties in the City of Rye that currently utilize septic systems also called onsite wastewater treatment systems (OWTS) to treat their domestic waste. In addition, 12 of these properties are served by individual wells. The project area is located northeastern portion of the City of Rye, adjacent to the Mill Pond, which is directly connected to the Long Island Sound.

This project has the potential of providing substantial environmental benefits to the community and areas beyond. The properties on Kirby Lane North and Grace Church Street are some of the few remaining that employ OWTS to handle domestic wastes. These existing OWTS, which were designed and installed several decades ago, no longer meet current Westchester County Health Department or New York State Department of Health codes and requirements.

While there have been no "reported" problems with the existing OWTS, ground water and surface water contamination is a potential threat where there is a failing OWTS. Since the project area drains to the Mill Pond, which connects to the Long Island Sound, the installation of sanitary sewers to service the houses within the project area will eliminate the potential for contamination from OWTS.

Area Description

The project area encompasses the entire length of Kirby Lane North and along Grace Church Street from approximately 400' east of Forrest Avenue to Guion Place. Fourteen of the parcels front on Kirby Lane North and the balance, 16 parcels, on Grace Church Street. On average, the residences contain three to five bedrooms on lots with an average size of one acre. Over 80% of the residences were constructed prior to 1969 and most of those more than 50 years ago. Only one of the lots is currently undeveloped.

The topography of the area slopes in a southern direction towards the Mill Pond and ultimately the Long Island Sound. Slopes range from moderate to severe. Rock outcrops are visible throughout the project area (particularly along Kirby Lane North) and bedrock is between 2 and 18 feet below the surface.

All 30 parcels within the project area currently use OWTS for treatment of sanitary sewage. The lots along Grace Church Street and a few on Kirby Lane North are on public water. However, 12 of the properties on Kirby Lane North use wells to supply water. These 12 properties are

situated in the steeper and rockier portion of the project area on lots that are about three-quarters of an acre in size with houses constructed in the 1950's.

The Kirby Lane North/Grace Church Street Sanitary Sewer Project (Project No. C3-5399-03-00) entails the installation of 2,800 linear feet of 8" gravity sewer and 1,600 linear feet of 4" force main to provide public sewer service to 30 homes along Kirby Lane North and Grace Church Street. All properties will connect to gravity sewer mains, which will flow to a new pump station to be constructed at a low point along Kirby Lane North. A force main will connect the pump station to an existing municipal sewer main located just west of the project in Grace Church Street. The existing 8" water main that runs along a portion of Kirby Lane North will also be extended to provide service to 12 residences, which currently use wells for potable water supply. The estimated cost for the sanitary sewer construction is $2.1 million.

OWTS Standards

Westchester County Health Department (WCHD) sets standards for the design and construction of sanitary sewage collection and treatment, and drinking water distribution and supply. These standards are based on the New York State Department of Health regulations. The current design standard for an OWTS is to allow for 200 gallons per day (gpd) of sewage per bedroom. Assuming an average bedroom count of four for each of the parcels, the project area would generate 6,000 gpd of sewage. As noted earlier, most of the houses in the project area were constructed in the 1960's and earlier when rules for the design of OWTS were basically non-existent, poorly enforced, and with technology that was not as advanced.

The systems at that time would have been constructed using septic tanks and leaching fields that when compared to today's standards would have tanks that are smaller and leaching fields that were substantially shorter. Under the current regulations, leaching fields are not permitted on slopes in excess of 15% or within 100' of wetlands. On several of the lots along Kirby Lane North, once areas of slopes in excess of 15% and wetlands are taken into account, only small areas are available for an OWTS. Additionally, the current WCHD regulations require at least 5 feet of separation between the bottom of the leaching field trench and bedrock. Since trenches are a minimum of 18 inches deep, this would require a depth to bedrock of at least 6 ½ feet. During the sanitary sewer design, many soil borings were taken throughout the project, and along Kirby Lane North bedrock was often encountered at depths of less than 5'. In our opinion, under today's WCHD regulations many of the lots would not have sufficient area to construct an OWTS capable of supporting a house.

In addition to the siting and design of an OWTS that must be considered when developing a property, the placement of a well to serve a home must also be taken into account. Thirteen of properties in the project area derive their drinking water from individual wells. WCHD regulations stipulate minimum separation distance between wells and OWTS. Where is well is uphill of the OWTS, the distance is 100 feet; and where the well is down gradient it increases to 200 feet. During the design and permitting phase of the project, existing well locations were determined. Based on the descriptions by residents as to where their OWTS is located, it was observed that in many properties the separation requirement was not met. When the regulation of the placement of wells in relation to OWTS (both on the property in questions and the

neighboring ones) is added to the environmental constraints (slopes, wetlands, bedrock) along Kirby Lane North, the feasibility of developing any of these parcels under today's regulations is doubtful.

Taking into consideration the environmental constraints precluding the construction of OWTS on many of the properties within the project area; if the area was being developed today, the only feasible solution to providing for the treatment of sanitary sewage would be the installation of a sanitary sewer collection system connecting to a regional treatment plant.

Effects of OWTS on the Environment

The New York State Department of Environmental Conservation (NYSDEC), Division of Water, Bureau of Watershed Management, developed a manual in October 2000 titled *Nonpoint Source Management Program* (NSMP) that set goals for the management of nonpoint pollution sources. Under the New York State Conservation Law, Section 17-0105, "point source pollution" is defined as:

> Any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agricultural or agricultural storm water runoff.

Nonpoint pollution is best described as a contrast to this definition. As stated in the NSMP, it is usually generated from "pollutants entering water at many locations from many sources, distributed diffusely over an area." Although the generators of these nonpoint pollution sources can be identified, their exact point of entry into a waterbody is difficult to pinpoint. The NSMP goes on further to say that, "individually-owned septic tanks could be collectively regarded as nonpoint sources of groundwater pollution."

Pollutants typically associated with OWTS include nutrients (nitrates and phosphates), bacteria, viruses, and toxins. Of these pollutants, nitrates and phosphates are considered an "important nonpoint source of pollution to ponds, streams, and the [Long Island] Sound."[1] According to the NSMP, failing and older OWTS not constructed in conformance with current design standards are "likely to result in impaired surface and ground waters." In general, OWTS have an average useful life of 25 to 50 years when properly maintained. Most of the systems in the project area are at least 25 years old and many have been in use for more than 50 years. Although there have been no documented reports of OWTS failure in the project area, the systems are reaching the end of their lifespan and it has been reported that at least one homeowner has had new fields installed due to system problems. Therefore, it can be concluded that the systems, a nonpoint source of pollution to the groundwater in the area, will only result in worse conditions over time.

Project Area Impacts

The Kirby Lane North/Grace Church Street area is located immediately adjacent to the Mill Pond. This body of water is classified by NYSDEC as a Type I water, an estuary with secondary

[1] Long Island Sound Study, *The Impact of Septic Systems on the Environment*

contact recreation. It is directly connected to the Long Island Sound, a Type SA water, waters used for shellfishing for market purposes, primary and secondary contact recreation, and fishing. Runoff and ground water from the project area flow towards the Mill Pond and then into the Sound.

"In terms of total waterbody size (i.e. acres or miles of shoreline) affected, agricultural activities, toxic sediments, urban runoff and failing on-site septic systems are the most significant nonpoint sources in the state [New York]."[2] For bays and estuaries, the NSMP categorized on-site systems (OWTS) with a "precluded severity" for water quality problems. Clearly, the age and standards of design for the OWTS in the project area would create a concern with water quality issues associated with them.

Studies of pollutant removal by OWTS have concluded that they remove 21% to 25% of the nitrogen loading. However, a study conducted in Massachusetts found that these values do not take into account the dilution of the effluent by precipitation into the OWTS and therefore concluded that a conventional "Title 5 system" (as system consisting of a septic tank and leach fields) removed less than 10% of the nitrogen.[3] An average OWTS produces 10 to 15 pounds of nitrogen per person per year. This would represent 1,500 to 2,000 pounds of nitrogen being generated from the project area per year.

The concern with nitrogen is that it is known to "fuel massive algae blooms, which in turn die, using up oxygen as they decompose."[4] The loss of oxygen leads to a condition call hypoxia, which is a major concern in the Long Island Sound. In the March 1994 *The Comprehensive Conservation and Management Plan* (CCMP) prepared by the Long Island Sound Study identified six problems that merited special attention. The first item on that list was hypoxia, which is primarily caused by excessive discharges of nitrogen. About half of the nitrogen in the Long Island Sound results from human activity. Twenty percent of that comes from nonpoint source discharges. The Long Island Sound CCMP concluded that to increase oxygen levels, which would in turn reduce hypoxia, it is necessary to reduce discharges of nitrogen into the Sound. The OWTS along Kirby Lane North and Grace Church Street are one source of human generated nitrogen.

Project Benefits

The Long Island Sound CCMP and the NSMP were produced to identify sources of pollution to the waterbodies and then outline guidelines, goals, and priorities for reducing the pollutants. Each of these documents identified OWTS as sources of nonpoint source pollution – primarily nitrogen, but also phosphates, bacteria, viruses, and toxins. Goals were set to reduce the levels of nonpoint source pollutants. The construction of the sanitary sewers along Kirby Lane North and Grace Church Street will help in achieving that goal by doing away with the need for OWTS thus eliminating this source of nonpoint pollution. Furthermore, due to the age and marginal design standards associated with their construction, the level of pollutant removal would be even

[2] NYSDEC, *Nonpoint Source Management Program*, October 2000, p III-1
[3] Costa, Joseph E. et al, "Nitrogen Removal Efficiencies of Three Alternative Septic System Technologies and a Conventional Septic System", *Environment Cape Cod*, Vol. 5, No. 1, Sept. 2002, p. 16
[4] Long Island Sound Study, *The Impact of Septic Systems on the Environment*

greater than what would be generated by a modern OWTS. The elimination of the nonpoint source pollution generated by the OWTS will be beneficial to the local waterbodies – the Mill Pond and the Long Island Sound. Groundwater quality will improve, as will that of stormwater runoff. The net result will be the completion of one action that works towards achieving the Long Island Sound CCMP and the NSMP goals.

One final benefit of the project is to the 12 properties that use wells for domestic water supply. The proximity of these wells to the OWTS, combined with the depth to bedrock would mean that wells in the area may be contaminated by pollutants from the OWTS. The installation of a central sewage collection system eliminates this potential health hazard.